Appendices B & C

MinXray *HF70DUL* Type A ultra light

High Frequency Portable Dental X-ray unit

Installation and Operating Instructions

Version 2.0

This special purpose portable equipment is for dental radiography only.
It is not designed, nor does it meet, the standards for any other use.

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INTRODUCTION

The MinXray model *HF70D* ultra light is a mono-block type high frequency portable dental x-ray unit. The *HF70D* can be used with conventional intraoral dental film or with solid-state digital radiographic intraoral sensors. It is supplied in a carrying case containing the x-ray tubehead/control, detachable dental cone (beam limiting device), detachable AC power cord, and detachable exposure cord with 2-stage exposure switch. The MinXray *HF70D* ultra light high frequency dental x-ray unit is designed for use with the MinXray model X100S Tripod or equivalent stand capable of providing secure, stable support that allows for proper positioning of the x-ray unit for intraoral radiographic imaging.

CARELESS OR IMPROPER USE OF X-RAY EQUIPMENT CAN BE EXTREMELY HAZARDOUS. It is imperative that this equipment be operated and serviced only by trained personnel familiar with the safety precautions required to prevent excessive exposure to primary X-ray radiation, the dangers of exposure to X-ray radiation, and the proper use of the equipment discussed in this manual.

All personnel authorized to operate or service this equipment should be fully acquainted with the established maximum permissible doses, safety recommendations, and procedures derived from the following sources:

A. National Council on Radiation Protection Report No.33 (Medical X-Ray and Gamma Ray Protection for Energies up to 10 MEV - Equipment Design and Use); from NRCP Publications; P.O. Box 30175, Washington, D.C. 20014.

B. National Bureau of Standards Handbook No.76 (Medical X-Ray Protection up to Three Million Volts); from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20401.

C. All documents relating to the Performance Standard for Diagnostic X-Ray Systems, 21 CFR Subchapter J, Part 1020; obtainable from FDA Center for Devices and Radiological Health, Department of HHS, 2098 Gaither Road, Rockville, MD 20850.

D. State and local regulations governing radiation protection and the use of diagnostic X-ray equipment.

E. Requirements of the user's in-house radiation protection program.

F. Instructions and precautionary notices of this manual.

Although this equipment incorporates protective design features for limiting both the direct (primary) x-ray beam and the secondary radiation produced by this beam, design factors alone cannot prevent human carelessness, negligence, or lack of knowledge. This apparatus is sold with the understanding that the user assumes sole responsibility for radiation safety and that MinXray, Inc., its agents and representatives, do not accept any responsibility for:

A. Injury or danger to patient or other personnel from x-ray exposure.

B. Overexposure due to poor operating techniques or procedures.

C. Equipment not properly serviced or maintained in accordance with this manual.

D. Equipment which has been modified or tampered with in any way.

E. Equipment that has been connected to input voltage other than the voltage specified on the rating label affixed to the x-ray unit.

F. Equipment that is connected to input voltage not utilizing the UL listed hospital grade detachable power supply cord set provided with the equipment.

Hand held use of this x-ray unit may be prohibited by the laws of your state. Contact the appropriate agency responsible for radiation safety regulations in your state to confirm the requirements of laws in your jurisdiction regarding hand held use of diagnostic x-ray equipment.

CERTIFICATIONS

CLASSIFIED C UL US
79DN

**MEDICAL EQUIPMENT
WITH RESPECT TO ELECTRIC SHOCK,
FIRE AND MECHANICAL HAZARDS ONLY
IN ACCORDANCE WITH UL 2601-1,
CAN/CSA C22.2 NO. 601.1,IEC 60601-1-3,
IEC 60601-2-7, IEC 60601-2-28**

THIS PRODUCT CONFORMS TO ALL APPLICABLE DHHS RADIATION STANDARDS OF 21 CFR SUBCHAPTER J AS OF THE DATE OF MANUFACTURE

MINXRAY INC

RECORD KEEPING REQUIREMENTS

1. Dealer and Distributor Records

a. Dealers and distributors of x-ray equipment shall obtain and preserve for a period of five years from the date of sale, award, or lease of each such product, such information as is necessary to permit tracing of specific products to specific purchasers.

b. Such information shall include:
1) The name and mailing address of distributor, dealer, or purchaser to whom the product was transferred.
2) Identification and brand name of the product.
3) Model number and serial or other identification number of the product.
4) Date of sale, award or lease.

2. Records to be furnished to MinXray, Inc. by Dealers and Distributors

The information required in "1" above shall immediately be forwarded to MinXray unless:

a. The dealer or distributor elects to hold and preserve such information, and to immediately furnish it to MinXray, Inc. when advised by MinXray or Director, Department of Health and Human Services, that such information is required for purposes of Section 359 of the Radiation Control for Health and Safety Act of 1968.

b. The dealer or distributor, upon making the election under "a" above of this section, promptly Notifies MinXray and the Center for Devices and Radiological Health of such election. Such notification shall be in writing and shall identify the dealer or distributor and the type of equipment for which the information is being accumulated.

3. Assembler's Report

All assemblers who install certified components should file a report of such assembly. All assembler's reports shall be on Form FD-2579, which is prescribed by and available from the Director, FDA/Department of Health and Human Services, Division of Compliance, 1390 Piccard Drive, Rockville, Maryland 20850. The original of Form FD-2579 shall be sent to the Director and copies to the purchaser, State Agency responsible for radiation protection, and one kept by the assembler for a period of least 5 years.

MINXRAY INC

TO: ALL MANUFACTURERS AND ASSEMBLERS OF DIAGNOSTIC X-RAY EQUIPMENT

SUBJECT : Final Testing of Diagnostic X-ray Systems and Components Following Assembly.

This letter is intended to establish HHS policy relative to final testing of a newly-assembled x-ray system or component before release to the user.

Manufacturer Responsibility - The FDA believes that plant-based manufacturers must include in their assembly instructions a specific requirement that the assembler perform a test(s) for the applicable requirements of the FDA performance standard at the time of installation. A thorough explanation of the equipment required and step-by-step instructions must be provide by the component or system manufacturer. The instructions should include a requirement to record key data to demonstrate at a later data that all tests were performed and that the equipment was left in full compliance with the standard. The FDA's Department of Health and Human Services will insure that these assembler test instructions are provided through a close review of the information submitted by manufacturers in initial, model change and annual reports. Plant-based manufacturers who do not include a final compliance test in their assembler instructions could be subject to disapproval of their quality control and testing program.

Assembler Responsibility - Assemblers of diagnostic x-ray equipment must perform a test or tests for the applicable requirements of the FDA performance standard at the time of installation if specified in the assembly instructions provided by the component or system manufacturer. Assemblers who do not perform and document such final compliance tests will be considered by the FDA to have issued a false and misleading certification and will, therefore, be subject to regulatory action by the Agency.

Should they be any questions concerning this Bureau policy please call X-ray Products Branch at 301-594-4591.

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COMPONENTS

1. X-ray Unit (Model *HF70DUL* Type A)	1 set
2. Power cord	1 pc.
3. Dental cone (Model BL70A)	1 pc.
4. Hand-held Exposure Switch and Cord	1 pc.
5. Instruction Manual	1 pc.
6. Carrying Case	1 pc.

OPTIONAL COMPONENTS

Backscatter Shield (Model BSS)

Tripod stand (Model X100S)

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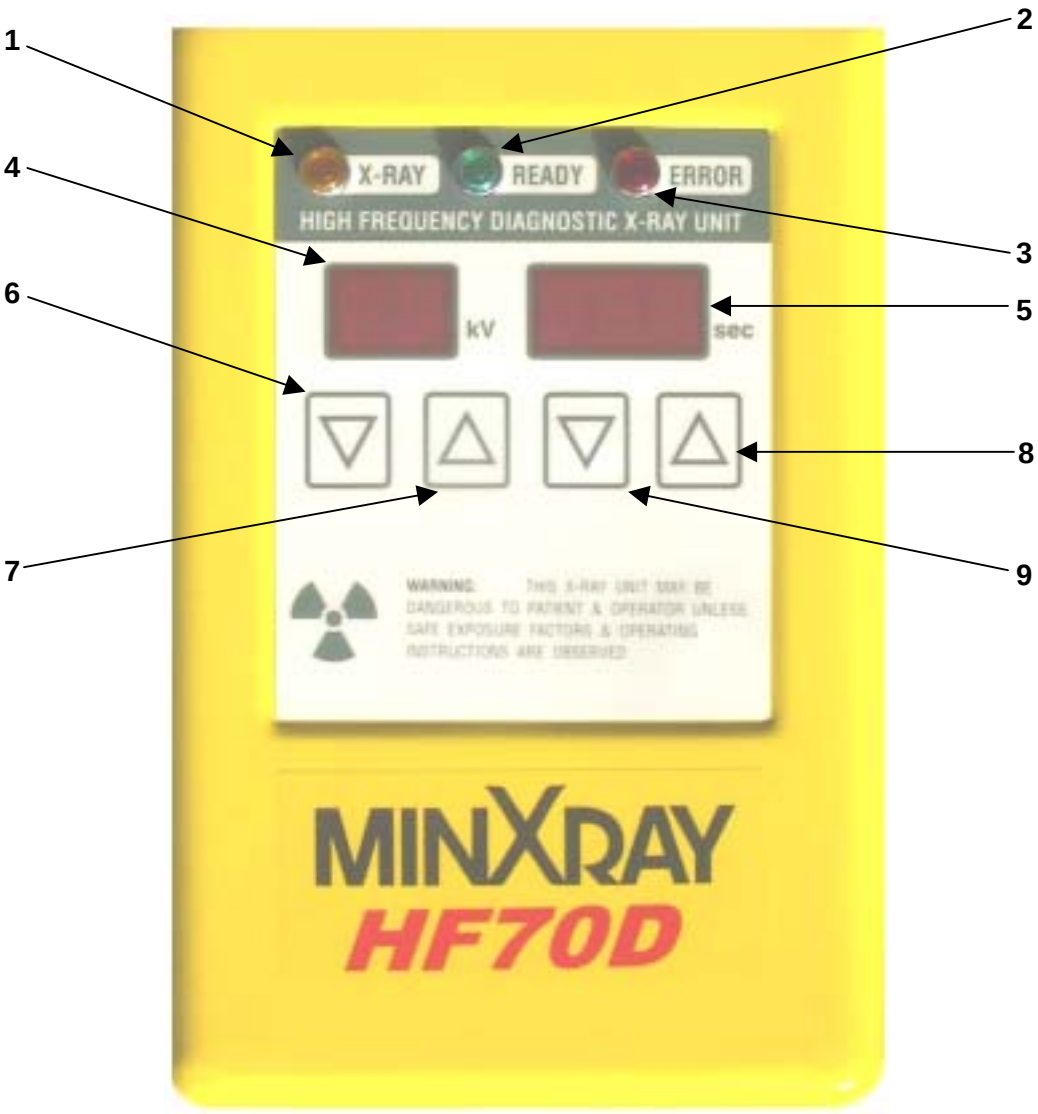
MAIN PARTS OF MinXray *HF70D* ultra light

CONTROL PANEL



1. X-ray Indicator
2. Ready Indicator
3. Error Indicator
4. kV Indicator
5. Exposure Time Indicator
6. kV Adjustment Button (-)
7. kV Adjustment Button (+)
8. Exposure Time Adjustment Button (+)
9. Exposure Time Adjustment Button (-)

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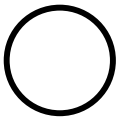
Warning statements, figures and symbols

WARNING: THIS X-RAY UNIT MAY BE DANGEROUS TO PATIENT & OPERATOR UNLESS SAFE EXPOSURE FACTORS & OPERATING INSTRUCTIONS ARE OBSERVED

DANGER: HIGH VOLTAGE. NO USER SERVICEABLE COMPONENTS INSIDE. REFER SERVICE TO QUALIFIED SERVICE TECHNICIAN.

Radiation warning symbol

Main power on



Main power off

Attention, consult ACCOMPANYING DOCUMENTS

MINXRAY INC

MinXray *HF70DUL* Type A ultra light

INSTALLATION INSTRUCTIONS

Unpacking

The MinXray *HF70D* ultra light portable x-ray unit consists of an x-ray tubehead and control, mounting handle, dental cone, backscatter shield, exposure cord, power cord, and carrying case.

If a stand is purchased with the *HF70D*, instructions for its assembly are included with the stand.

When the equipment is received each shipping container should be carefully examined for any evidence of mishandling during shipment. Note its condition, if abnormal, carefully unpack all parts and examine for damage. If any damage is noted, immediately report it to the carrier in the proper manner, by personally calling it to attention by phone where possible, and filing a written report.

All printed matter supplied with the *HF70D* should be saved for reference during installation and operation.

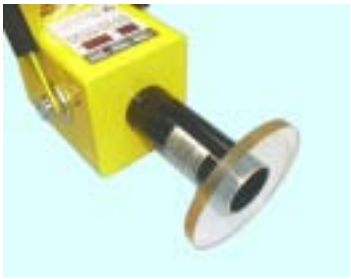
Assembly Instructions

1. Remove the *HF70D*, dental cone, backscatter shield, power cord, and exposure cord from the carrying case.

2. If the *HF70D* will be attached to the top of the center post of the X100S tripod stand, rotate the carrying handle of the *HF70D* around the rear of the unit so it is positioned under the unit. Place one flat black rubber washer on the thread stud on the center post of the tripod. Insert the threaded stud on the center post of the tripod through the hole in the center of the carrying handle of the *HF70D*. Place the second flat black rubber washer on the stud of the tripod center post and on top of the *HF70D* carrying handle. Affix the *HF70D* to the tripod using the brass thumb nut. Adjust the length of each telescoping tripod leg, and lock it. Adjust the height of the center post and lock it.

3. Carefully screw the dental cone into the cone holder on the front of the *HF70D*. Avoid cross-threading the cone when attaching it to the *HF70D*. NEVER OPERATE THE *HF70D* UNLESS THE DENTAL CONE IS ATTACHED.

4. If the optional BSS Back Scatter Shield was purchased for use with your *HF70D*, slide it onto the open end of the dental cone after you attach the cone to the x-ray unit before use. The BSS Back Scatter Shield is made from a clear lead-impregnated plastic. It provides additional protection to the operator from radiation backscatter from the patient during x-ray exposure.



5. Connect the AC power cord to the socket on the back of the *HF70D*. Note the rated voltage of the *HF70D* before connecting it to a power source.

6. Connect the exposure cord to the RJ11 telephone-type socket on the back of the *HF70D*.

PRE-OPERATIONAL REQUIRED TESTING

The following test is the responsibility of the dealer and must be conducted without fail. Fill out the checklist for this report, when installation of x-ray unit is complete.

1. EXPOSURE TIMER

1-1 Test method:

1. Set *HF70D* exposure timer to 0.02 sec.
2. Set *HF70D* output to 70 kV.
3. Set NERO to the following settings.
   SID: 18 inches; Wheel range: 50 ~ 85 kV; Sensitivity: Low; Phase select: 1Ø;
   Measurement mode: STAT; X-ray values: 70 kV, 0.02 sec.

4. Make exposure and read the measured value of exposure time on the NERO.
5. Measure value of exposure time at following settings with same procedure: 0.02, 0.04, 0.10, 0.20, 0.50, and 1.00 sec.

1-2 Instruments: NERO Model 6000M x-ray beam analyzer
Manufactured by Victoreen, Inc. or equivalent

1-3 Rejection limit: ±10%+1 msec.

If the timer needs adjustment: (1) remove the 4 screws on the side of the top cover of the *HF70D*, and lift the top off of the body of the unit; (2) adjust the potentiometer "VR3"on the printed circuit board M3115 on the inside of the top cover (see Fig.1) so that radiation exposure time equals the indicated time value, taking into consideration the accuracy tolerances; (3) replace the top cover and 4 screws.

Fig.1

2. PEAK TUBE POTENTIAL

2-1 Test method:
1. Set *HF70D* exposure timer to 0.2 sec., and set kV to 60 kV.
2. Set NERO to the following settings:
   SID: 18 inches; Wheel range: 50 ~ 85 kV; Sensitivity Hi; Phase select: 1Ø;
   Measurement mode: SGL; Time delay 0.1 sec; X-ray values: 60 kV, 0.2 sec.
3. Make exposure and read the measured AVG. kV value on the NERO.
4. Measure also value of AVG. kV at 65 kV, 70 kV with same procedure.

2-2 Instruments: NERO Model 6000M x-ray beam analyzer
Manufactured by Victoreen, Inc. or equivalent

2-3 Rejection limit: ±10%

If the peak tube potential needs adjustment: (1) remove the 4 screws on the side of the top cover of the *HF70D*, and lift the top off of the body of the unit; (2) adjust the potentiometer "VR3" on the printed circuit board M9142 located on top of the lower portion of the unit (see Fig. 2) so that peak tube potential equals the indicated kV value, taking into consideration the accuracy tolerances; (3) replace the top cover and 4 screws.

3. TUBE CURRENT

3-1 Test method:

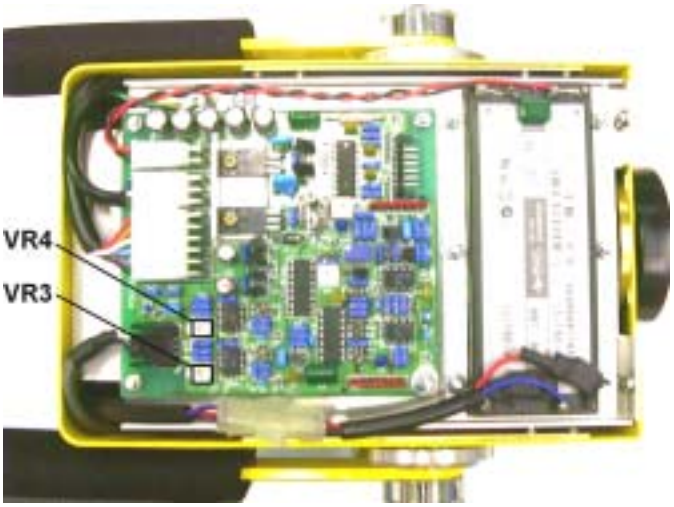
1. Set *HF70D* to 60 kV, and timer to 0.2 sec.
2. Set oscilloscope to the following settings.
   ch 1:Ep, ch 2:Ip, ch1 V/div: 1V, ch2 V/div: 500 mV, sec/div: 25 msec,
   trigger level: ch1 1.5 V
3. Open the top cover of the *HF70D* by removing the 4 screws and lifting the cover off of the unit. Connect ch 1 of oscilloscope to Ep pin of PC board M9142 and connect ch 2 of oscilloscope to Ip pin of PC board M9142. Connect GND line of probe to GND pin of PC board M9142.
4. Make exposure, and measure Hi value of ch 2. 1.0 V is equal to 10 mA.
5. Measure Hi value of ch 2 at 70 kV and 0.2 sec. with same procedure.

3-2 Instruments: Digital Storage & Analog Oscilloscope 2212
Manufactured by Tektoronix Holland, N.V. or equivalent

3-3 Rejection limit: ±20%

If the tube current needs adjustment: (1) adjust the potentiometer "VR4" on the printed circuit board M9142 (see Fig. 2) so that tube current equals 10 mA, taking into consideration the accuracy tolerances; (2) replace the top cover and 4 screws.

Fig.2



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INSTALLATION CHECK LIST

INSTALLATION CHECK LIST		*HF70DUL* Type A	
	Fill out this checklist when installation is complete.	**SERIAL NO.**	
		DATE MANUFACTURED	
EQUIPMENT LOCATION			

TEST DESCRIPTION	**ACCEPTANCE LIMITS**	**RESULTS**	**CHECK**
Line Voltage	110~130 V	…….V	☐ GO ☐ NO GO
Line Voltage Regulation	≤ 4.8%	……..%	☐ GO ☐ NO GO
Peak Tube Potential	60 kV±10% 65 kV±10% 70 kV±10%	……kV ……kV ……kV	☐ GO ☐ NO GO
Tube Current	10mA±20%	……mA	☐ GO ☐ NO GO
Exposure Time	0.02 sec ±10%+1 msec. 0.04 sec ±10%+1 msec. 0.1 sec ±10%+1 msec. 0.2 sec ±10%+1 msec. 0.5 sec ±10%+1 msec. 1.0 sec ±10%+1 msec.	……sec ……sec ……sec ……sec ……sec ……sec	☐ GO ☐ NO GO
All Mechanical Movement	Smooth Movement		☐ GO ☐ NO GO
All Operation	See operation Manual		☐ GO ☐ NO GO

Instruments Used	Manufacturer	Model	Accuracy	Last calibrated

Dealer Name	Dealer Phone Number
Dealer Address	
Assembler signature	Date
Comments	

MINXRAY INC

INSTRUCTION MANUAL FOR BL70A DENTAL CONE

CAUTION: This special purpose beam limiting device is developed for use with an intraoral dental x-ray unit only. It is not designed, nor does it meet, the Standards for any other use.

ASSEMBLY: Carefully screw clockwise the *BL70A* dental cone into the cone holder on the front of the x-ray tubehead. Avoid cross-threading the cone when attaching it to the tubehead to prevent leakage radiation and distortion of the x-ray field. NEVER OPERATE THE X-RAY UNIT UNLESS THE DENTAL CONE IS ATTACHED.

CHECK: Confirm that there are no cracks or chips on the dental cone. If there are any cracks or chips on the dental cone, replace it with a new, intact cone. NEVER OPERATE THE X-RAY UNIT WITH A DAMAGED DENTAL CONE.

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HF70DUL Type A OPERATION INSTRUCTIONS

Operation

1. Connect the AC power cord to a grounded electrical outlet. Check the label on the *HF70D* for the correct AC input voltage and amperage required.

2. Turn on the main power switch on the *HF70D*. The kV and sec LED displays will light and remain on. The *HF70D* has internal circuitry to automatically compensate for variations in the input voltage to assure consistent kV and mA output.

3. Select the kV output by pressing the arrows below the kV display to choose 60, 65, or 70 kV. 10 mA output is fixed at all kV settings.

4. Select the exposure time by pressing the arrows below the sec display to choose between 0.02 and 1.98 second exposures.

5. Position the x-ray unit for the intraoral image you will be taking.

6. The exposure switch has a 2-stage button.

   The first stage pre-heats the filament of the x-ray tube. When this stage alone is depressed and held, " READY " indicator will light after 1.5 seconds, indicating the filament was heated and the unit is ready to generate x-rays.

   The second stage initiates the x-ray exposure for the time set in the sec display. When the second stage is fully depressed, x-ray will be emitted, the X-RAY indicator will light, and an audible signal will be heard. PRESS AND HOLD THE FIRST AND SECOND STAGE BUTTONS TOGETHER UNTIL THE EXPOSURE HAS TERMINATED. This is a "dead man" exposure switch--x-ray exposure will terminate immediately as a safety feature when the buttons are released.

7. After each exposure, release the exposure buttons. The *HF70D* is now ready for the next exposure.

8. When you are finished using the *HF70D*, turn off the main power switch, disconnect the AC power cord and exposure cord, unscrew the dental cone, and repack these components with the *HF70D* into the carrying case.

Safety Precautions

1. During exposure the operator must stand as far as possible from the patient being x-rayed, and should wear a lead apron or stand behind a lead shield.

2. The operator must not stand in the primary x-ray beam.

3. The operator should wear a monitoring dosimeter while operating this unit. It should be worn where it is not covered by a lead apron.

4. X-ray exposure should be kept as short as possible.

5. NEVER OPERATE THE *HF70D* UNLESS THE DENTAL CONE IS ATTACHED.

6. The presence of radio frequency (RF) or electromagnetic radiation may adversely affect the operation of this device. Please keep this equipment away from likely sources of RF radiation.

If the operator is hand holding the *HF70DUL* Type A during exposure, the operator must wear lead gloves, a lead apron, and a monitoring dosimeter. Only use model BL70A dental cone (beam limiting device) for hand held use. The optional BSS backscatter shield should be used to protect the operator from radiation backscatter during exposure. Check with your state's radiation safety agency to determine if hand held operation of diagnostic x-ray equipment is allowed in your state.

Preventive Maintenance

Clean the *HF70D* as needed with a damp sponge or cloth and mild soap.

Before each use:

1. Tubehead

    - Make sure the certification and identification labels are in place.
    - Check for any loose or missing screws.
    - Check for oil leaks.
    - Check for any physical damage.
    - Check the kV adjustment for proper operation.
    - Check the timer for proper operation.
    - Check all cords and cord connections.
    - Check the exposure buttons--the exposure must terminate if the button is released during an exposure.

2. Dental Cone (beam limiting device)

    - Make sure the certification label is on the cone.
    - Check for any physical damage.

3. Indicators

    - Check the X-RAY indicator for proper operation when both exposure buttons are depressed and held.
    - Make sure the audible signal operates during an exposure.
    - If the ERROR INDICATOR is on, it means the unit has malfunctioned and x-ray cannot be generated.

    If ERROR INDICATOR is lit even after the EXPOSURE SWITCH is released, it means an unusual situation has occurred. Turn off the MAIN POWER SWITCH, wait 3 minutes, then start procedures over again. If the ERROR INDICATOR remains on, contact your dealer or MinXray for service.

*** Have this unit checked by qualified service personnel immediately if any problems occur with the *HF70D*.

Every 12 months

Calibration should be checked and adjusted if necessary at 12-month intervals by qualified service personnel to assure that the *HF70D* is operating within its stated specifications. The following items should be checked:

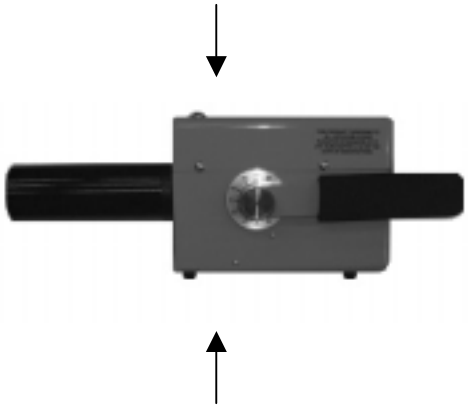
- kV output should be ±10%.
- mA output should be ±20%.
- Exposure time should be ±10%+1ms.

Every 2 years

Radiation leakage should be measured by qualified service personnel. If leakage radiation at 1 meter is > 10 mR/h, contact MinXray Technical Service department for assistance. Follow these steps to take these measurements:

- Set ion chamber of the x-ray dosemeter at a distance of 1 meter from the *HF70D* at each of the 5 positions below:

Top view



Side view

- Cover the open end of the beam limiting device (BLD) with lead. Set kV to 70 and exposure time to 1.0 sec. Make exposure.

- Measure the mR output at each of the 5 test points at a distance of 1 meter from the *HF70D*.

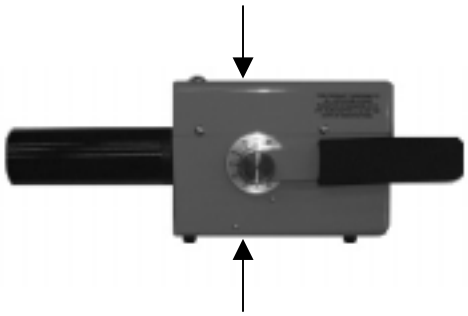
  Calculate the leakage radiation mR/hour = (raw output reading) mR × 3600 × (duty cycle)1 / 60

<u>If this *HF70DUL* Type A is to be hand held in use, then the following additional measurements of radiation leakage should be taken every 2 years.</u>

Radiation leakage should be measured by qualified service personnel. If leakage radiation is > 5 µR/6mAs at the surface of the *HF70D*, contact MinXray Technical Service department for assistance. Follow these steps to take these measurements:

- Set ion chamber of the x-ray dosemeter at the surface of the *HF70D* at each of the 7 positions below:

Top view



Side view

- Cover the open end of the beam limiting device (BLD) with lead. Set kV to 70 and exposure time to 0.6 sec. Make exposure.
- Measure the mR output at each of the 7 test points at the surface of the *HF70D*.

MinXray can supply detailed technical service and parts information to qualified service personnel upon request.

CAUTION: High voltage components inside.
Only qualified technical service personnel should open the HF70D outer case.
Damage caused to internal components during service may void the warranty.

MINXRAY INC

MinXray *HF70D* ultra light High Frequency Portable Dental X-ray Unit

Output setting: 65 kVDC @ 10mA
Patient size: Adult
Source-Image Distance: 8''

		Exposure times (sec.) Direct radiography	Exposure time (sec.) D speed film	Angle (degrees)
Maxillary	Molars	0.08	0.24	20
	Bicuspids	0.08	0.22	30
	Cuspids	0.08	0.18	45
	Incisors	0.08	0.18	40
Mandibular	Molars	0.08	0.18	-5
	Bicuspids	0.06	0.14	10
	Cuspids	0.06	0.14	20
	Incisors	0.06	0.14	15
Anterior Bite-Wing	Size 1 Adult	0.06	0.14	8
	Size 2 Child	0.04	0.10	8
Posterior Bite-Wing	Type 2 or 3 Adult	0.08	0.18	8
	Type 0 Child	0.06	0.12	8

Notes: These are recommended starting techniques for adults.
For children reduce exposure times about 33 %.
For edentulous areas, reduce exposure time about 25%.
If images are too dark (overexposed), reduce exposure time.
If images are too light, increase exposure time.

MINXRAY INC

MinXray *HF70DUL* Type A ultra light SPECIFICATIONS

Rating

Line Voltage	AC, single-phase, 120V, 50/60Hz
Line voltage regulation	4.8%
Input current	Stand by: 0.165A Momentary: 14.5A
Maximum output power	70kVDC, 10mA
Protection against electrical shock	Type B, Class I
Mode of operation	Continuous operation with intermittent loading
Duty cycle	1 : 60 (1 sec. On, 60 sec. Off)
Degree of protection against the ingress of water	Ordinary
Degree of safety of application in the presence of a FLAMMABLE ANAESTHETIC MIXTURE WITH AIR or WITH OXYGEN OR NITROUS OXIDE	Equipment not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.
Fuse	10 A @ 125V (on M9161)

X-ray Generator

Output range	10 mA @ 60, 65, 70 kVDC ±10%
Timer range	0.02-1.98 sec. , 99 total steps
Electric power	0.7 kW @ 70 kVDC , 10 mA
Maximum deviation from fixed factors	Tube potential ±10% Tube current ±20% Exposure time ±10%+1 msec
Leakage technique factors	0.16 mA @ 70kV 0.16 mA is maximum rated continuous current for 10 mA with duty cycle 1:60
Inherent filtration	1.0 mm Al equivalent
Total filtration	2.0 mm Al equivalent
Half value layer	2.42 mm Al @ 70 kV
High voltage circuit output	60 kHz high frequency inverter system with neutral ground circuit
Electromagnetic compatibility (EMC)	Complies with IEC60601-1-2, 1993

X-ray tube

Manufacturer	Toshiba
Type	D-0711SB
Focal Spot	0.7 mm
Anode heat storage	10 kHU

Dental Cone (Beam Limiting Device)

Manufacturer	MIKASA
Type	BL70A

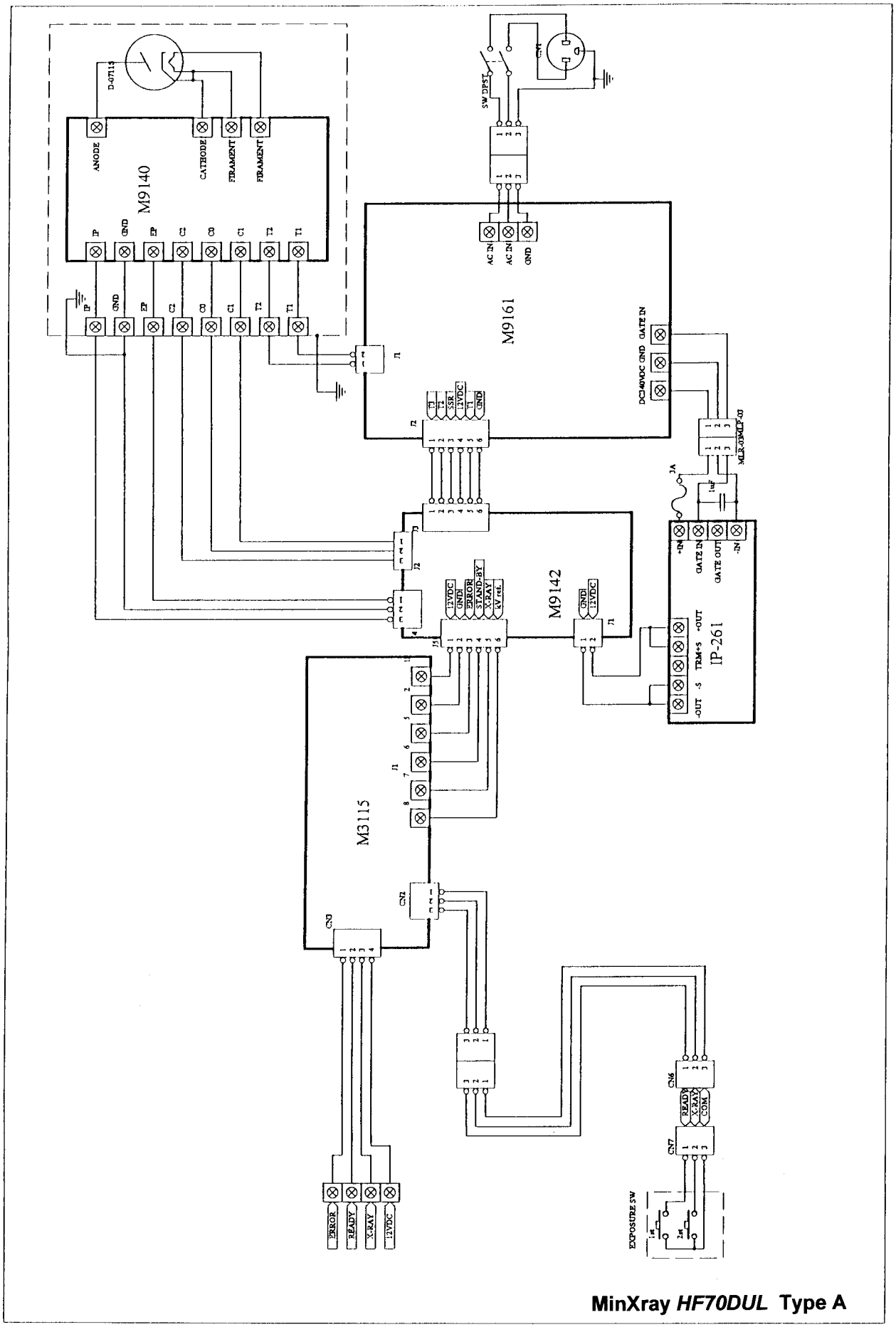
Dimensions and Accessories

Equipment	7.4" (18.8 cm) W x 6.14" (15.6 cm) H x 8.11" (20.6 cm) L, plus dental cone
Focus to Cone Tip Distance	7.91" (20.1 cm)
Weight	11.5 lbs (5.15 kgs.)
Exposure Switch	Two-stage, deadman with RJ11 connector
Exposure Cord	8 feet (2.8 m)
Detachable Power Cord	20 feet (6.1 m), Listed and CN, 16 AWG 3 conductor, TWO-POLE SOCKET- OUTLET WITH HOSPITAL GRADE PLUG WITH GROUND PIN
Stand	Fits MinXray X100S tripod

Environmental conditions for transport and storage

Ambient temperature range	-40℃ ~ 70℃
Relative humidity range(including condensation)	10% ~ 100%
Atmospheric pressure range	500hPa ~ 1060hPa

The MinXray *HF70D* is compatible with all radiographic imaging modalities, including digital.



MinXray *HF70DUL* Type A

Stationary Anode X-Ray Tube

- Especially designed for dental X-ray unit.
- Provided with an insulation cylinder (D-0711S) and lead cylinder (D-0711SB).
- These tubes have focus 0.7 mm, and are available for maximum tube voltage 70 kV with DC.
- Installed in the same enclosure with the high tension transformer.

General Data

Electrical :

Circuit (Center-grounded) ..... DC
Operating Tube Voltage ..... 50 to 70 kV
Focal Spot ..... 0.7 mm
Input Energy (at 1.0s) ..... 940 W
(See rating charts)

Mechanical :

Dimensions ..... See dimensional outline.
Overall Length:
D-0711 ..... 67 mm
D-0711S ..... 72 mm
D-0711SB ..... 72 mm
Maximum Diameter:
D-0711 ..... 31 mm
D-0711S ..... 38 mm
D-0711SB ..... 42 mm
Target Angle ..... 16 degrees
Inherent Filtration ..... At least 1.0 mm Al equivalent at 70 kV
X-ray Coverage ..... ϕ107 mm at SID 200 mm

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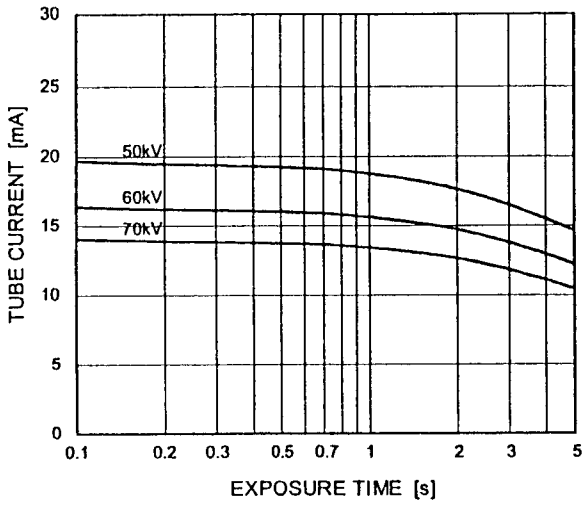
Maximum Rating Charts
(Absolute maximum rating charts)

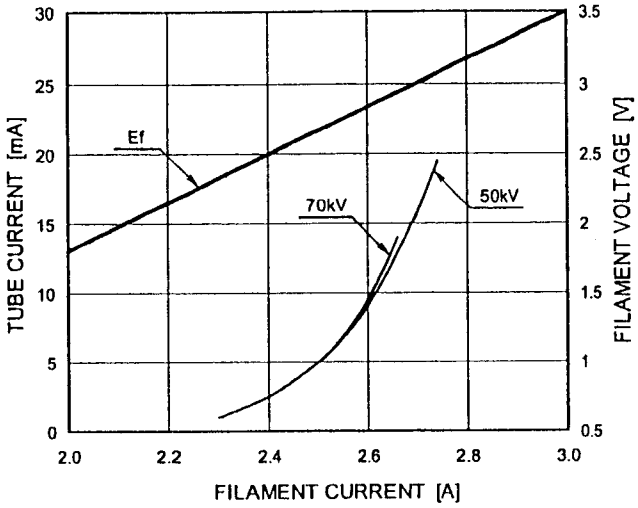
DC

Focal Spot : 0.7 mm

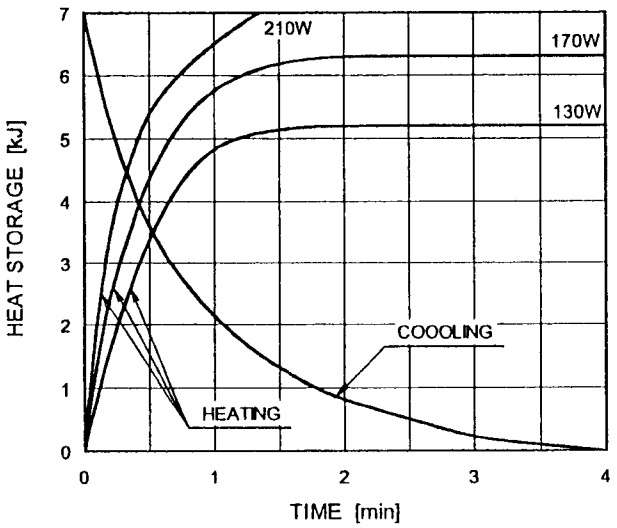


Emission & Filament Characteristics

DC

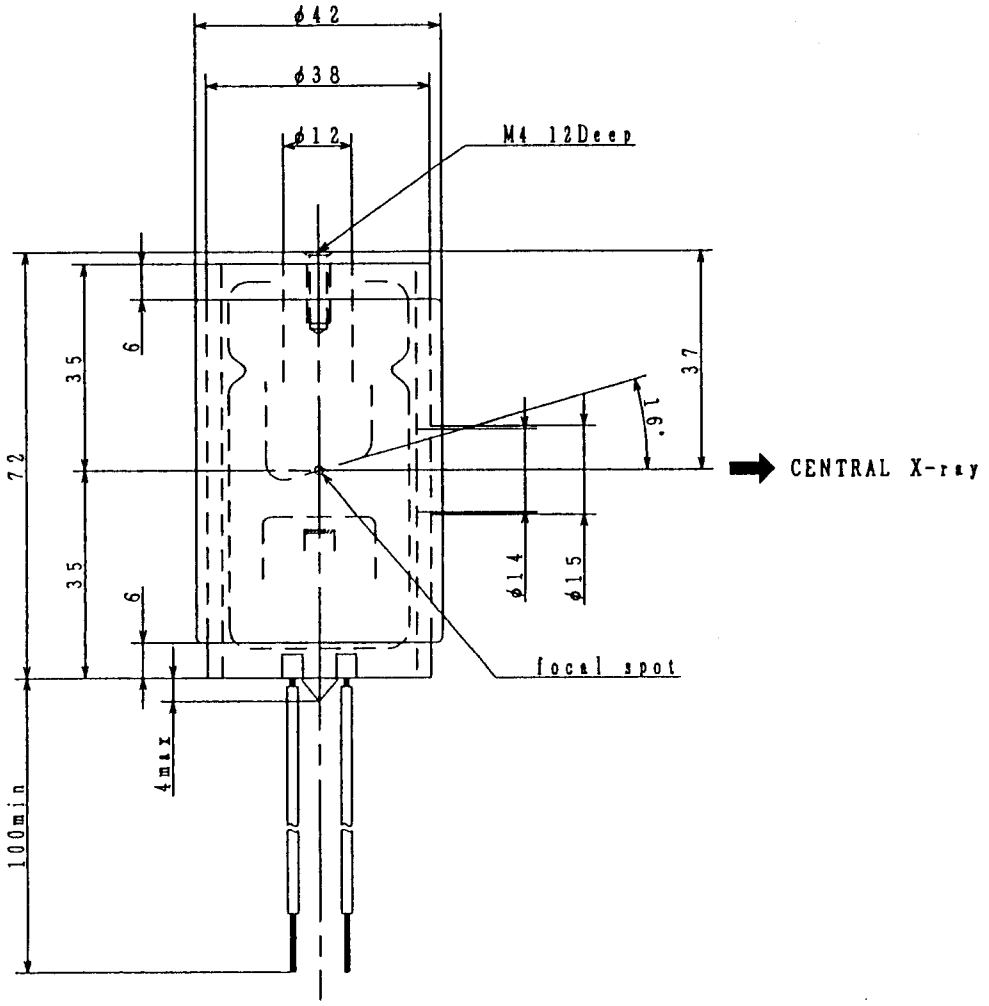


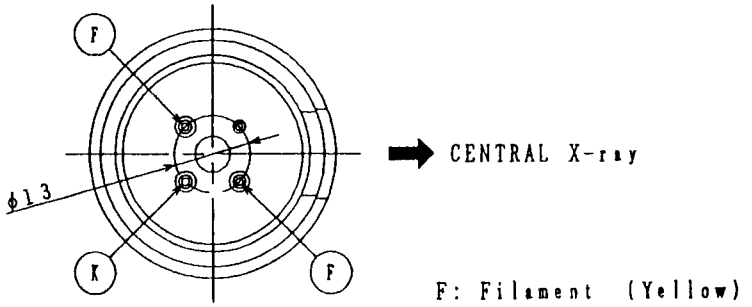
Anode Thermal Characteristics



Dimensional Outline of D-0711SB

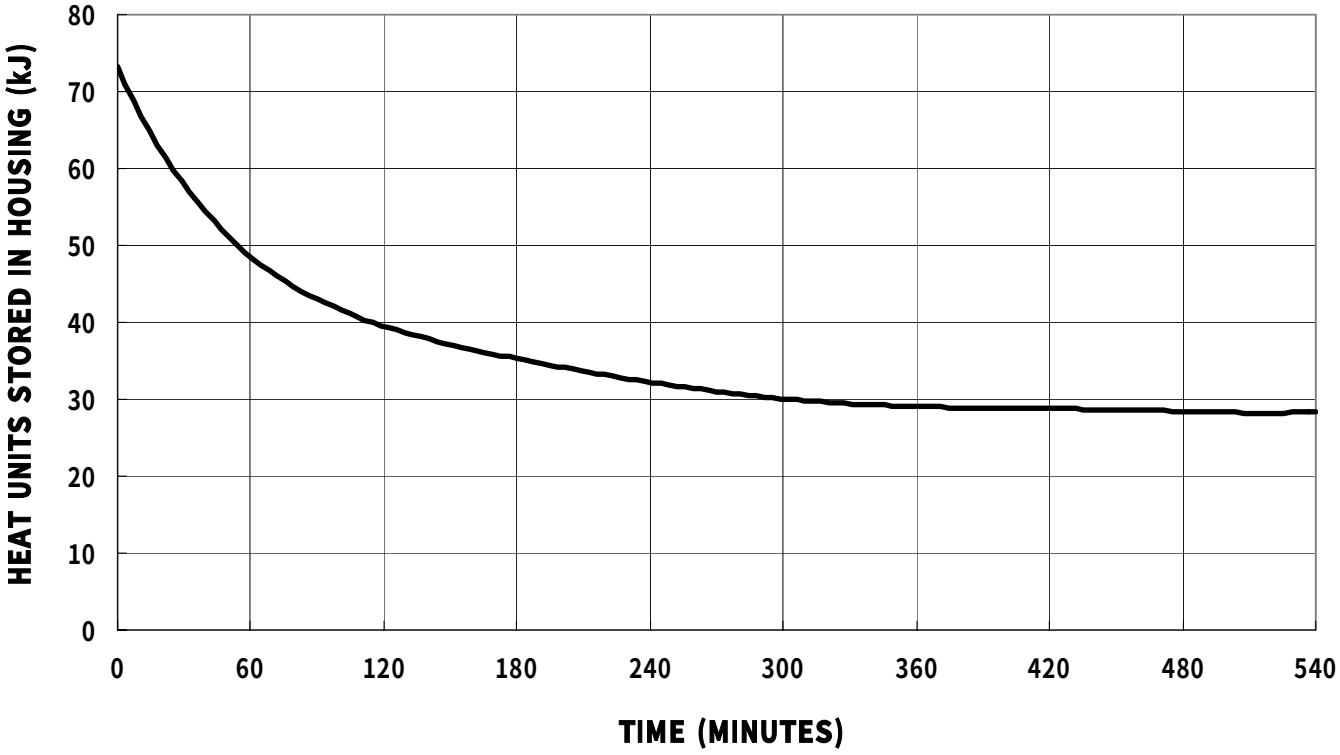
Unit mm





F: Filament (Yellow)
K: Cathode (Black)

HF70DUL Type A TUBE HOUSING COOLING CURVE



MinXray *HF70D* ultra light Limited Warranty

MinXray, Inc. warrants the MinXray model *HF70D* ultra light portable dental x-ray unit to be free from any defects in material or workmanship for a period of one (1) year from the date of original installation. MinXray, Inc. warrants stands, accessories, and carrying cases purchased from MinXray to be free form any defects in material or manufacture's workmanship for a period of one (1) year from the date of original installation. The warranty on the beam limiting device is provided solely by its manufacturer.

The liability of MinXray, Inc. is limited to repair or replacement of any parts that MinXray determines to be defective. Parts proving defective will be repaired or replaced free of charge, F.O.B. Northbrook, Illinois, U.S.A., if defective equipment is returned to MinXray, Inc. for inspection, freight charges prepaid. All warranty claims must be made not later than ten (10) business days following the expiration of the applicable warranty period. Equipment repaired or replaced under warranty will continue to be warranted for the balance of the original warranty term.

This warranty does not apply to equipment that is or has been abused, misused, or altered, improperly maintained, subjected to use beyond rated conditions, or damaged as a result of any carelessness or accidents. This warranty does not cover ordinary wear and tear or maintenance.

MinXray, Inc. makes no other warranty, either express or implied, with respect to any equipment purchased from MinXray, including without limitation any implied warranties of merchantability or fitness for a particular purpose, whether or not MinXray may have been informed of the actual uses to which any of such equipment may be put. MinXray hereby disclaims all such other warranties. MinXray, Inc. shall not under any circumstances be liable for incidental, indirect, consequential, punitive or exemplary damages, including without limitation damages for delay or lost profits, and in no event shall MinXray's liability arising from the purchase, sale or use of the equipment, or breach of any warranty made above, exceed in the aggregate the purchase price paid therefore.

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